LINEAR ADJUSTABLE HEAD RESTRAINT

DESCRIPTION

Technical Field

[Para 1] The present invention relates generally to an automotive seat assembly and more particularly to an automotive seat assembly with a linear adjustable head restraint.

Background of the Invention

[Para 2] The design features within an automobile provide a balance between comfort and safety. Additionally, these design features must commonly be ergonomically adapted to engage a wide variety of occupant shapes and sizes. Often, however, in the attempt to cover the wide variety of shapes and sizes, individualized adjustment can take a secondary position. While this may be necessary in some circumstances, in other design situations novel inventive progressions may allow personalized adjustment to remain on the same level as universality of operation.

[Para 3] An example of an automotive design feature that epitomizes this balance can be found in head restraints also known as head rests. Design for these head restraints commonly involves placement to minimize rearward head movement during vehicle impact. Designs commonly provide minimal adjustment features as they are primarily considered extensions of the vehicle seat. They are commonly provided with vertical adjustments such that they can accommodate occupants of varying heights. Further features to customize the head restraint to an individuals size, shape, or individualized comfort preferences are generally absent from head restraint design. Occupants, similar to personalities, can have an infinite range of seating preferences. Head restraint position, relative to the seatback, can provide comfort to occupants based on their preferences. Additional adjustment features, therefore, would provide occupants with greater comfort.

[Para 4] Additionally, by adding new adjustment features to a head restraint assembly it may be possible to minimize the distance between the head restraint and the occupants head. This distance can be used to reduce occupant head travel and thereby may be utilized to minimize stress imparted to the occupant during vehicle

impact. It would, therefore, be highly desirable to have a head restraint assembly with advanced individualized adjustment features. It would additionally be highly desirable to have a head restraint assembly that provided fore/aft adjustment features such that the distance between the occupants head and the head restraint could be minimized.

Summary of the Invention

[Para 5] It is, therefore, an object of the present invention to provide an automotive seat assembly with an adjustable head restraint assembly. It is a further object of the present invention to provide such a head restraint assembly that includes a head restraint that is movable linearly between a horizontal range of positions.

[Para 6] An automotive seat assembly is provided including a seatbase defining a seatbase plane and a seatback defining a seatback plane. The automotive seat assembly includes an automotive head restraint assembly comprising a head restraint support member configured to extend vertically from the seatback. The head restraint support member has a vertical extension portion extending generally parallel to the seatback plane and at least one horizontal travel arm generally perpendicular to the seatback plane. The vertical extension portion positioned between the seatback and the at least one horizontal travel arm. A head restraint inner structure engages the at least one horizontal travel arm such that the head restraint inner structure is movable linearly to a plurality of positions along the at least one horizontal travel arm. A head restraint outer structure surrounds said head restraint inners structure to provide a comfortable outer surface.

[Para 7] Other objects and features of the present invention will become apparent when viewed in light of the detailed description of the preferred embodiment when taken in conjunction with the attached drawings and appended claims.

Brief Description of the Drawings

[Para 8] FIGURE 1 is an illustration of an automotive seat assembly in accordance with the present invention.

[Para 9] FIGURE 2 is a detailed illustration of the head restraint assembly for use in the automotive seat assembly illustrated in Figure 1

[Para 10] FIGURE 3 is a detailed illustration of the head restraint support member for use in the head restraint assembly illustrated in Figure 2.

[Para 11] FIGURE 4 is a cross-sectional illustration of the head restraint assembly for use in the automotive seat assembly illustrated in Figure 1.

[Para 12] FIGURE 5 is an alternate embodiment of the head restraint assembly for use in the automotive seat assembly illustrated in Figure 1.

[Para 13] FIGURE 6 is an alternate embodiment of the head restraint assembly for use in the automotive seat assembly illustrated in Figure 1.

[Para 14] FIGURE 7 is an illustration of a head restraint assembly for use in the automotive seat assembly illustrated in Figure 1.

[Para 15] FIGURE 8 is a detailed illustration of a portion of the head restraint assembly illustrated in Figure 7, the detail illustrating the rear head restraint inner structure removed.

[Para 16] FIGURE 9 is a detailed illustration of a portion of the head restraint assembly illustrated in Figure 8, the detail illustrating the forward head restraint inner structure removed.

[Para 17] FIGURE 10 is an alternate embodiment of the detailed illustration shown in Figure 8, the detail illustrating the use of a motor assembly.

Description of the Preferred Embodiment(s)

[Para 18] Referring now to Figures 1 and 2, which are illustrations of an automotive seat assembly 10 in accordance with the present invention. The automotive seat assembly 10 illustrated is intended to encompass a wide variety of seating configurations for both front and read automotive seats. The automotive seat assembly 10 includes a seatback 12 defining a seatback plane 14 as is well understood in the art. A head restraint assembly 16 is intended for use in conjunction with the seatback 12 for further passenger comfort and safety. The present invention provides a unique and beneficial head restraint assembly 16 to provide an increase in the comfort and safety of the automotive seat assembly 10.

[Para 19] The automotive head restraint assembly 16 includes a head restraint support member 18 mounted to and extending vertically from the seatback 12. The head restraint support member 18 may be manufactured in a variety of fashions. However one particular embodiment contemplates a novel two-piece tubular support member 18 wherein the two pieces can be manufactured using simple machining techniques and joined with a weld 20 to form a single head restraint support member 18. The head restraint support member 18 includes a vertical extension portion 22 commonly comprising two vertical extension arms 24 extending from the seatback upper surface 26 generally parallel to the seatback plane 14. The head restraint

support member 18 further includes at least one horizontal travel arm 28 orientated generally perpendicular to the seatback plane 14 and generally perpendicular, therefore, to the vertical extension portion 22. The term generally perpendicular is intended to embody the fact that the horizontal travel arm 28 provide a generally fore/aft orientation within the vehicle.

[Para 20] Although a variety of horizontal travel arms 28 are contemplated, one embodiment contemplates the use of a pair of horizontal travel arms 28, each formed with parallel side arms 30 having an arced travel arm end 32 (see Figure 3). A horizontal base arm 34 is positioned between the two horizontal travel arms 28. The advantage of this configuration is that it allows the head restraint support member 18 to be formed by simple bending of a tubular element. In addition the arced travel arm ends 32 and the horizontal base arms 34 can be utilized as stops for limiting motion of a head restraint inner structure 36.

[Para 21] The head restraint inner structure 36 engages the horizontal travel arm(s) 28 such that it is movable along these travel arms 28 linearly through a plurality of position. This gives the head restraint inner structure 36 fore/aft adjustment abilities within the vehicle while retaining its orientation. Although this may be accomplished in a variety of fashions, one embodiment contemplates the use of one or more travel channels 38 formed through the head restraint inner structure 36 (See Figure 2 and 4). The travel arms 28 are positioned within the travel channels 38 such that the head restraint inner structure 36 is constrained into linear travel along the horizontal travel arms 28. This configuration helps prevent jamming during movement and insures proper alignment. It is contemplated that the head restraint inner structure 36 be formed from cast polymer although variety of materials and manufacturing techniques are contemplated. In addition, as described above, the travel channels 38 either alone or in combination with stop features 40 may be used to limit motion of the head restraint inner structure.

[Para 22] It is desirable for the head restraint inner structure 36 to not only be movable to a variety of positions along the travel arms 28, but to be secured in each of these plurality of positions as well. To this end, the present invention includes a plurality of engagement notches 42 formed in the at least one travel arm 28. A locking arm 44 is mounted to the head restraint inner structure 36 and includes a locking blade 46 designed to engage one of the plurality of engagement notches 42 when in a locking arm engagement position 48. The locking arm is 44 is additionally movable into a locking arm disengagement position 50 wherein the locking blade 46 moves out of contact with the engagement notches 42 and the head restraint inner structure 36 is free to move along the horizontal travel arm 28. The locking arm 44 is preferably biased towards the locking arm engagement position 48. This can be accomplished in a variety of fashions such as through the use of a locking arm biasing spring 52 in communication with the locking arm 42 and the head restraint inner structure 36. A channel guide 54 formed in the head restraint inner structure 36 can act as a guide for

the locking blade 46 in addition to preventing rotational torque from being transferred to the locking arm 44. In at least one embodiment, the plurality of engagement notches 42 are unidirectional wherein they only engage in one direction. By way of example, they may be uni-directional such that the head restraint inner structure 36 may be moved forward even when the locking arm 44 is in the locking arm engagement position 48.

[Para 23] The locking arm 44 and engagement notches 42 as described represent only a single embodiment of the present invention. In other embodiments, the locking arm 44 may include a gearing assembly 56 that engages the engagement notches 42 (see Figure 5). In such an embodiment, rotation of the locking arm 44, such as through the use of an operator's knob 58, can be used to transfer rotational drive to the engagement notches 42 and thereby allow the head restraint inner structure 36 to be moved through a plurality of positions along the horizontal travel arm 28. In addition, a motor assembly 60 may be utilized instead of manual actuation (see Figure 6). The motor assembly 60 is preferably mounted directly to the head restraint inner structure 36. In such a case the motor assembly 60 may be placed in communication with a controller 62 positioned remotely in the vehicle by way of a wire harness 64 or other such communications method. In this fashion, controls for movement of the head restraint inner structure 36 may be placed in any convenience and ergonomic position within the vehicle. Additionally, if a hollow tube head restraint support member 18 is utilized, the wire harness 64 may be positioned within the head restraint support member 18 such that is can be strung into the seatback 12 while remaining conspicuous to the operator.

[Para 24] In an alternate embodiment illustrated in Figures 7 through 10, the head restraint inner structure 36 may be comprised of a forward head restraint inner structure 66 and a rear head restraint inner structure 68. In this embodiment the locking arm 44 is mounted to the head restraint support member 18. This may be accomplished in a variety of fashions such as mounting the locking arm 44 to the rear head restraint inner structure 68 which in turn is mounted to the head restraint support member 18. A cam assembly 70 is positioned between the locking arm 44 and the forward head restraint inner structure 66 and is in communication with both the arm 44 and the structure 66 such that rotation of the locking arm 44 rotates the cam assembly 70 and forces the forward head restraint inner structure 66 forward. A head restraint support structure biasing spring 72 can be utilized to bias the head restraint inners structure 36 against the cam assembly 70. This is beneficial as the cam assembly 70 provides forward control of the head restraint inner structure 36 without a rigid physical connection. As shown in Figure 10, a motor assembly 74 may be mounted to the rear head restraint inner structure 68 and control rotation of the locking arm 44. This can be utilized to allow electronic control of the forward head restraint inner structure 66 positioning.

[Para 25] While particular embodiments of the invention have been shown and described, numerous variations and alternative embodiments will occur to those skilled in the art. Accordingly, it is intended that the invention be limited only in terms of the appended claims.